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خلاصه مقاله:

The triaxiality of the stress state is known to greatly influence the amount of plastic strain which a material may undergo before ductile failure occurs. It is defined as the ratio of hydrostatic pressure, or mean stress, to the von Mises equivalent stress. This paper discusses the effects of stress triaxiality on yielding behavior of anisotropic materials. Hill-von Mises's criteria for anisotropic material have been used with triaxiality factor (TF). Mathematical model that combines the yield stress and anisotropic ratio R (ratio of width strain to thickness strain) along with triaxiality have been formulated. This model is considered as an objective function subjected to inequality constraint. Constrained optimization is solved using genetic algorithm. The results obtained give the set of principal stresses along with corresponding critical triaxiality which is the maximum value at which the material can sustain without failure. If triaxiality extends further more the material will go to plastic deformation and may prone to failure. In this way, the critical triaxiality of materials can be determined to avoid fracture and failure of materials. This article is important from the industrial application point of view by considering triaxiality as a design parameter while designing the component.

کلمات کلیدی:

Stress triaxiality, Hill-von Mises stress, Anisotropy ratio, Yield stress